



Department of Defense

GPS Status and GPS Modernization

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Session Overview

- GPS Constellation Status
- GPS Modernization Program
- OCS Upgrades
- GPS III
- Questions and Answers



Constellation Status

	A	B	C	D	E	F	Launched Nov 10
1	SVN 39	SVN 22	SVN 36	SVN 24	SVN 51	SVN 41	
2	SVN 25	SVN 30	SVN 33	SVN 46	SVN 21	SVN 26	
3	SVN 38	SVN 13	SVN 31	SVN 17	SVN 40	SVN 43	
4	SVN 27	SVN 35	SVN 37	SVN 34	SVN 23	SVN 32	
5	SVN 19	SVN 44		SVN 15		SVN 29	

27 Operational Satellites
6 - Block II 18 - Block IIA 3 - Block IIR



Goal of GPS Modernization Program

Navwar Capability While Providing Civil Enhancements

- **Military**
 - **Protection** of service for US/Allied forces
 - Add new signals and increased signal power to improve Navwar capability
 - Modify select platforms to detect and locate GPS jamming
 - Develop and field improved anti-jam and security technologies
 - **Prevention** of adversary exploitation
 - Spectrally separate new military signals from civil signals
 - Modify select platforms to accomplish mission
- **Civil**
 - **Preservation** of civil use while providing enhancements
 - Add new signals to improve accuracy and signal redundancy

The Termination of Selective Availability is the first step in the GPS Modernization Process



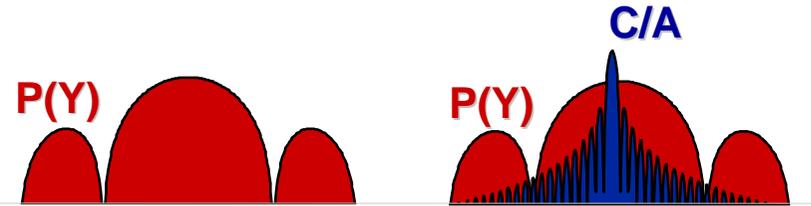
Modernized Signal Evolution

L5

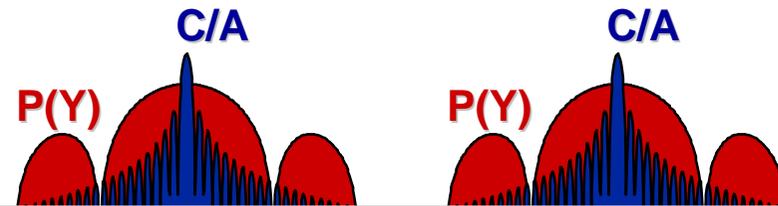
L2

L1

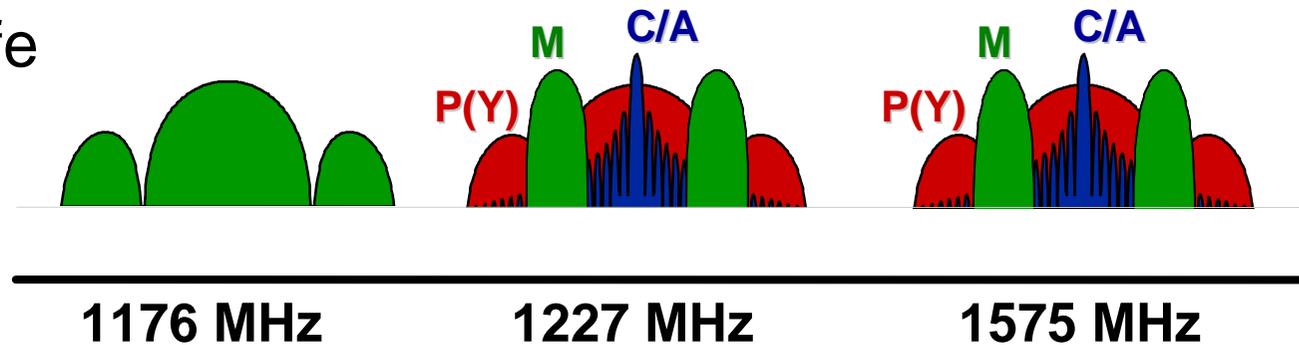
Present Signal



New Civil General Utility Signal



Civil Safety of Life Applications and New Military Signals



1176 MHz

1227 MHz

1575 MHz

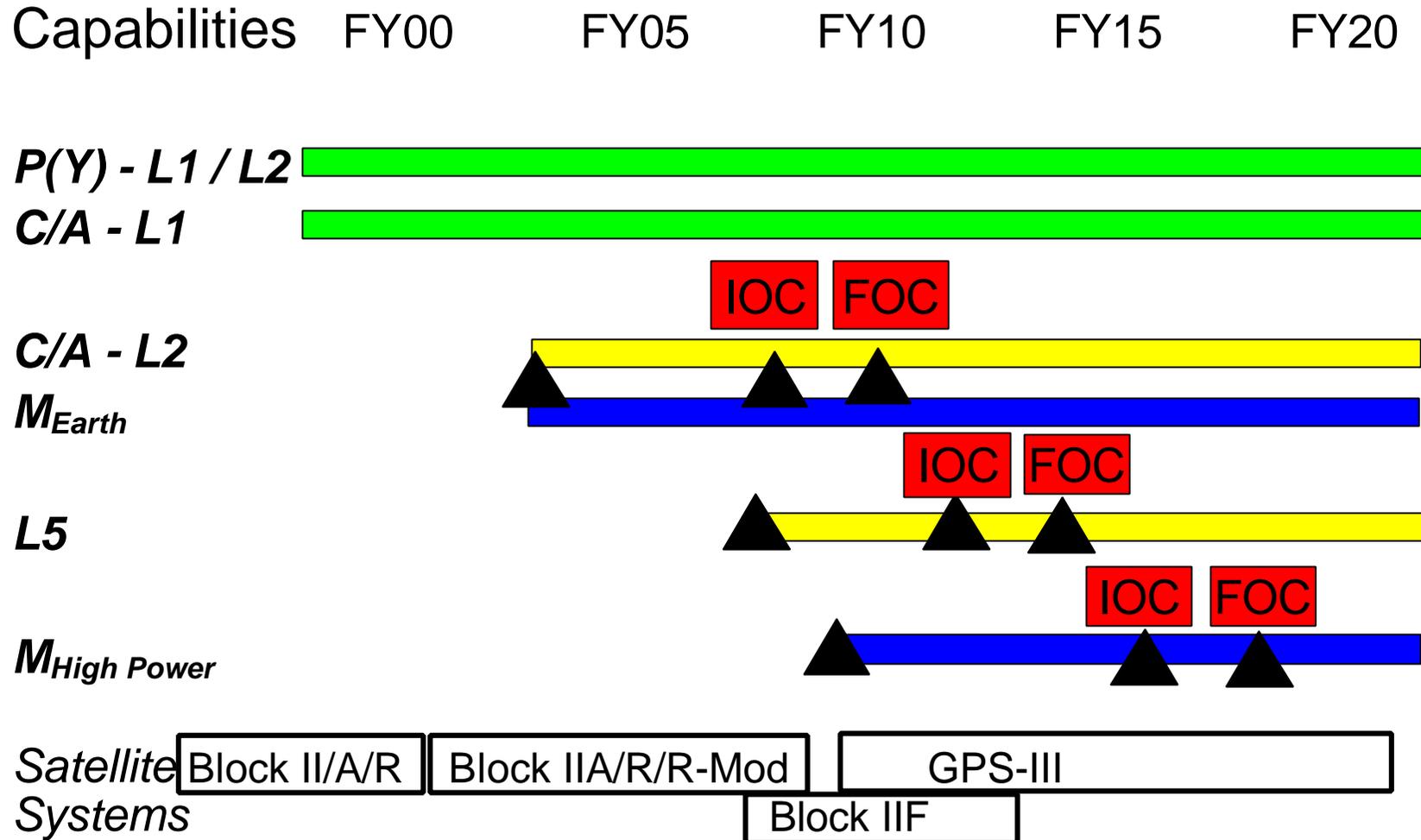


GPS Modernization Program Approval Status

- Operational Requirements Document (ORD) signed
- Amendment to President's Budget (PB) sent to Congress
- Congressional approval for GPS Modernization as a "New Start" received
 - Block IIR Modification letter contract awarded - Aug 00
 - Block IIF Undefinitized Contract Change for Modernization development issued on current contract - Aug 00
 - GPS-III Systems Architecture and Requirements Definition (SARD) Phase
 - Contracts awarded to Boeing and Lockheed Martin - Nov 9 00



GPS Modernization Capabilities





Block IIR- Modified Satellites

L1 Enhancements

- Increased P(Y) code power
- Increased C/A code power
- New M_E code at higher power than the upgraded P(Y) code



L1

L2



L2 Enhancements

- Increased P(Y) code power
- New C/A code with increased power over the current C/A code power levels
- New M_E code at higher power than the upgraded P(Y) code

- *Two new military signals (M_E on L1 and L2)*
- *One new civil signal (C/A code on L2)*
- *Increased power on all existing navigation signals (no changes required to batteries or solar arrays)*



Block IIF Satellites

L1 Enhancements

- *New M_E code added*
- *Complete definition of all new capabilities pending detailed design decisions*



L1 L5 L2

L2 Enhancements

- *New M_E code added*
- *C/A code added*
- *Complete definition of all new capabilities pending detailed design decisions*

L5 Signal

- *New robust Civil Signal*

- *Two new military signals (M_{earth}) L1 and L2*
- *Two new civil signals (C/A on L2 starting with Block IIR - Modified and new civil code on L5)*
- *Could increase power on some of these signals*



OCS Upgrades

- Architectural Evolution Plan (AEP)
 - A phased approach to replacing existing mainframe based legacy control system with open architecture, distributed network
- Launch, Anomaly and Disposal Operations (LADO)
 - Replaces AFSCN Command and Control System functionality for GPS by FY04
- IMOSC Development
 - Develops integrated Block II/IIA/IIF mission operations support center to replace existing MOSC
- High-Fidelity System Simulator
 - First installation at Vandenberg AFB for initial crew training; to be complete by end of CY00



OCS Modernization

- Initiated OCS SPI Modernization Study - 22 Aug 00
 - Define Operations Concept and Top-Level Implementation Approach
 - Define Block IIR and Block IIF Test and Operational Capability
 - Provides NTE for System Development Cost
 - Modifies both legacy and new distributed architecture
- Development begins Spring 01



GPS III Program Objectives

- Plan and grow system capabilities to meet future user needs for precise positioning and timing services
 - GPS ORD objective values as the target
- Procure most cost-effective system to meet future military and civilian requirements through 2030
 - Reduce Total Ownership Costs
 - Conscientious cost - benefit analyses for future requirements
- Make optimal use of system augmentations and complementary systems
- Re-look at entire GPS system architecture
 - Identify system-level trades for all system segments - space, control segment and user equipment

Ensure best GPS system for the next 30 years



GPS III Program Approach

- System Architecture / Requirements Definition (SA/RD)
 - Space, UE and OCS system-level trades - open, iterative process
 - Define system architecture to lead into a System Requirements Review (SRR)
- Preliminary Design and Risk Reduction (PD/RR)
 - Competitive Source Selection after SA/RD phase
 - Two qualified sources compete for system design to reduce risk in Engineering, Manufacturing and Design (EMD) phase
- EMD / Production
 - Down-select to single contractor at Preliminary Design Review (PDR) - FY03
 - Conduct risk analysis for EMD
 - Solidify EMD Phase strategy

Three phase approach - flexible, allows future changes, reduces risk



GPS III SARD Phase

- Purpose
 - Assess system wide architectural alternatives to:
 - Meet ORD requirements
 - Reduce total ownership costs
 - Provide flexibility and robustness to meet evolving military and civil requirements for the next 30 years



GPS III SARD Phase

- Overview
 - Competitive selection of two contractor teams
 - Contracts awarded to Boeing and Lockheed Martin Nov 00
 - 12 month study
 - Government SARD Team
 - JPO lead ensemble of military and civil agency participation
 - Review and blend contractors' analysis and other government studies
 - Form the final baseline and alternatives to be presented to the Defense Acquisition Board (DAB)



Backup Charts



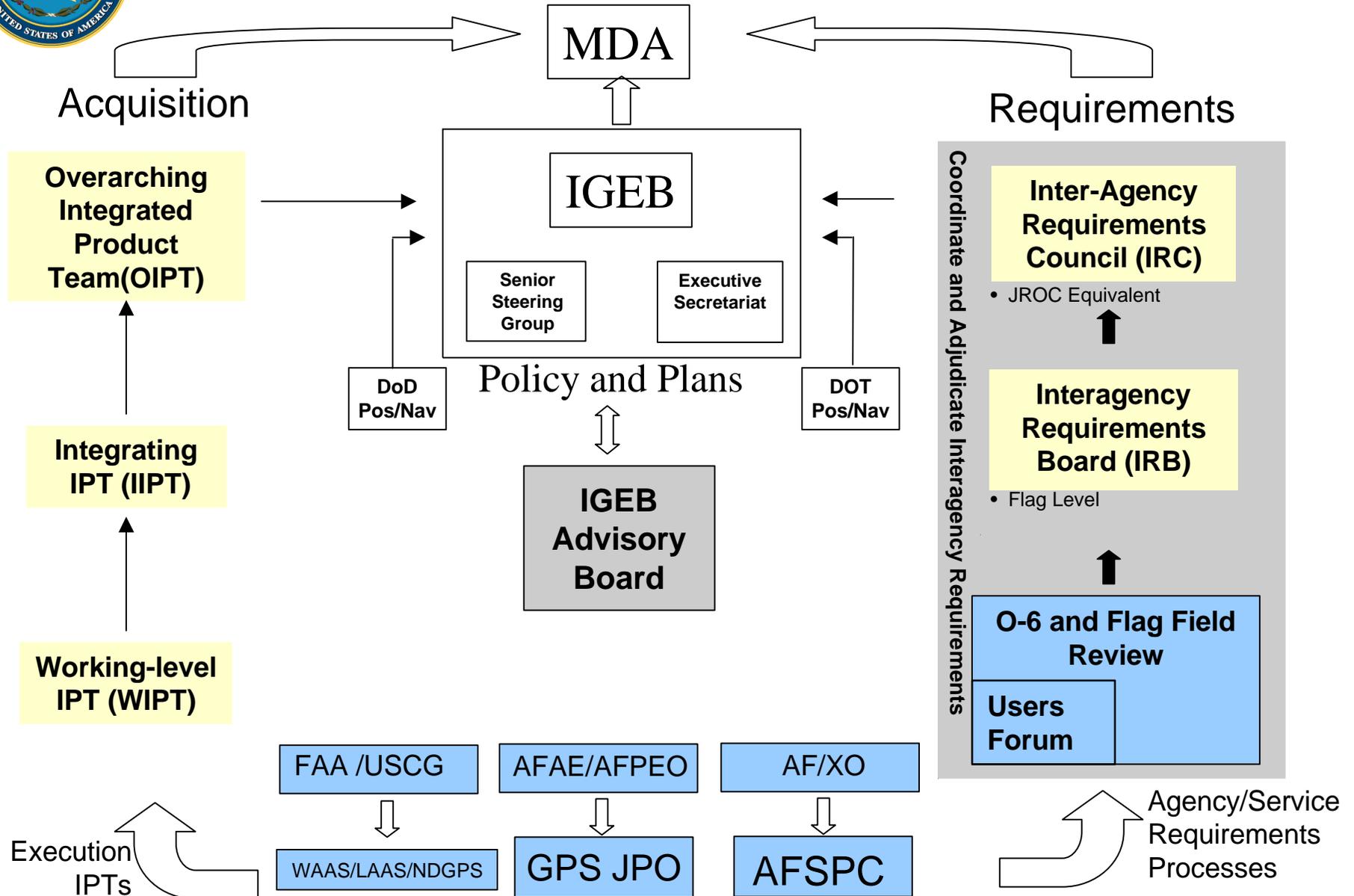
DoD Requirements and Acquisition Process

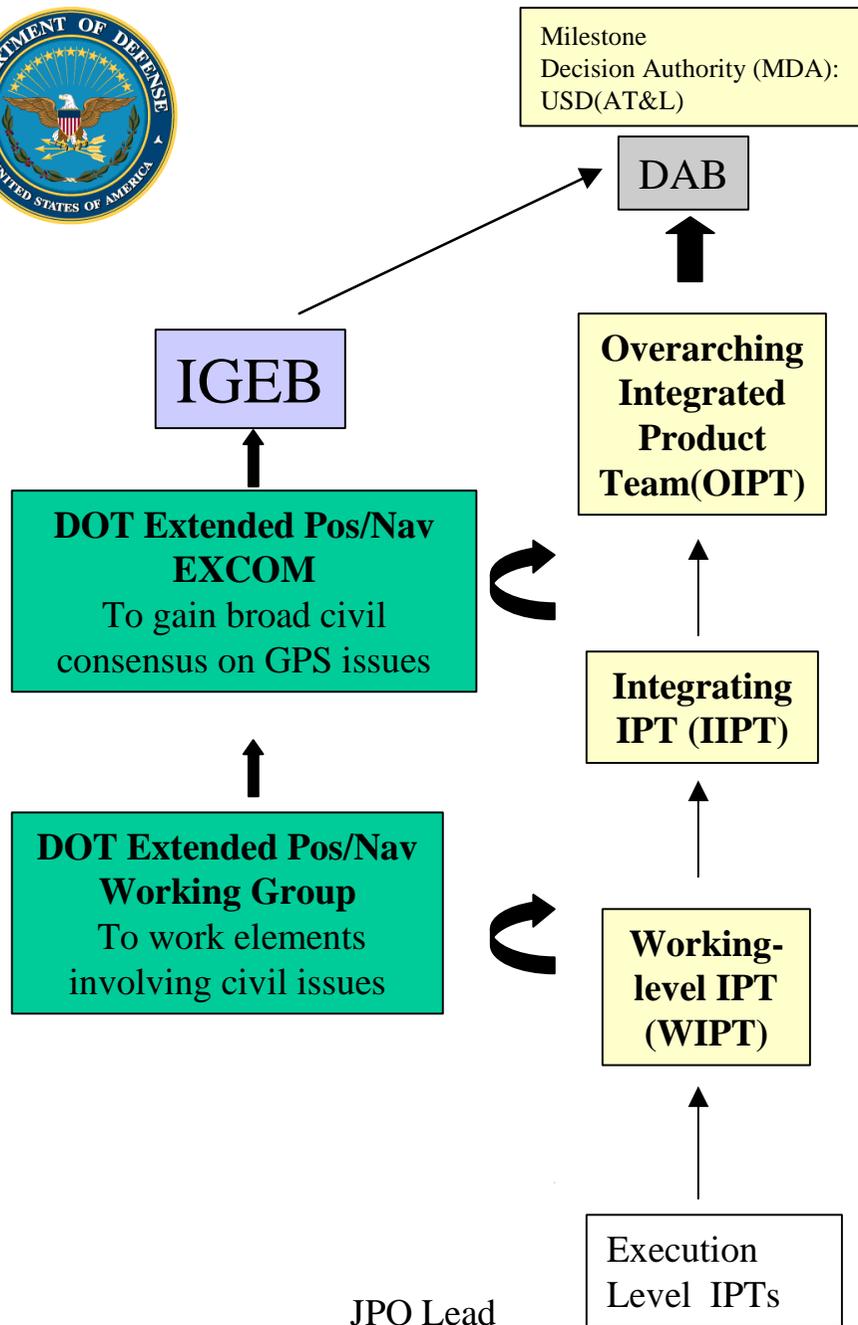
- DoD Directive 5000 series provides well established Decision Support Systems for:
 - Requirements Generation
 - Acquisition Management
 - Planning, Programming and Budgeting
- Bottom-up approach to making decisions with focus on:
 - Resolving issues at lowest levels
 - Building consensus

**DoD's processes can
accommodate civil involvement**



Conceptual Civil Involvement in Acquisition, Requirements and Policy Structure



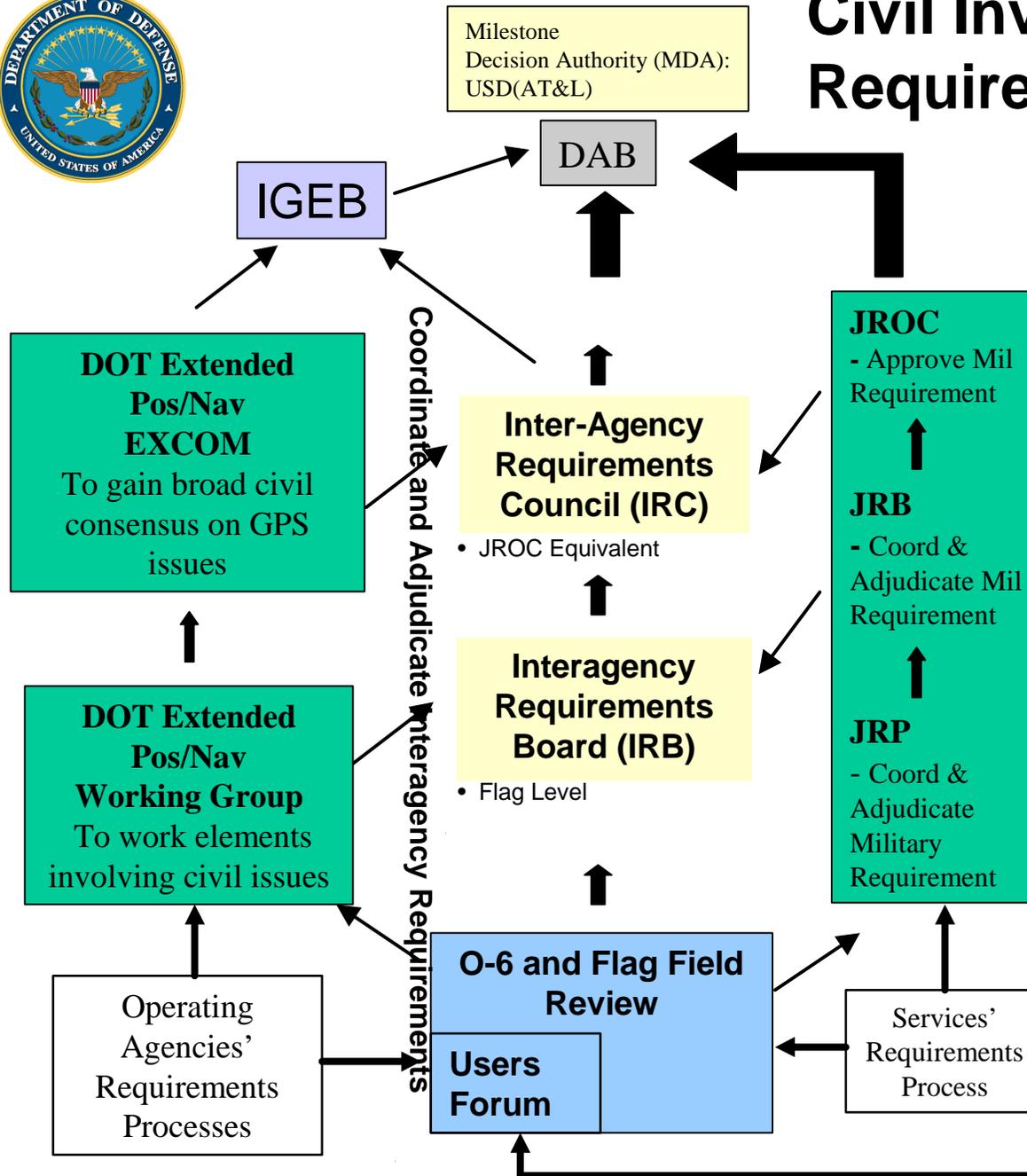


Civil Involvement in Acquisition Process

- IPT Structure
 - Provide strategic guidance, and program status/assessment
 - Identify and resolve issues at appropriate level
 - Seeks opportunities for acquisition reform
 - “Inter-disciplinary” participation
- Civil representation at each IPT level
 - 3 -5 civil representatives
 - Full civil participation through Extended DOT Pos/Nav structure
- IGEB
 - Fulfills role defined in PDD
 - Provides advisory role to DAB
 - Structure currently exists



Civil Involvement in Requirements Process

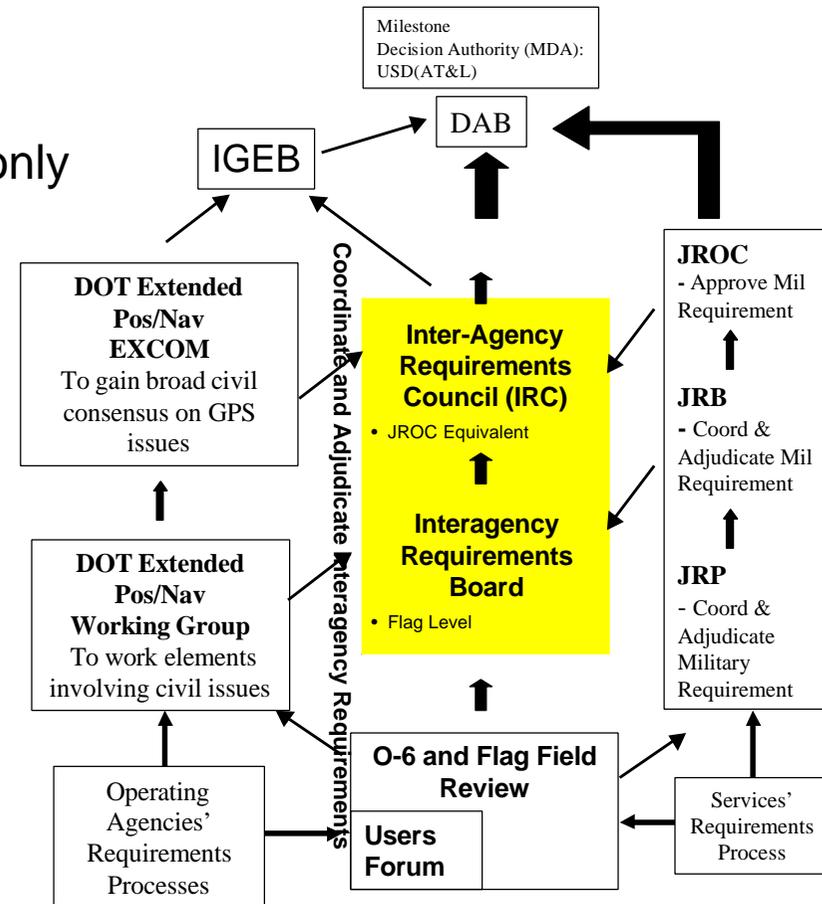


- NPOESS Model
 - Provides forum to address requirements and solution trades which cross military/civil boundaries
 - Independent process from program development
 - Each agency's requirements are accountable and traceable
 - Focused "user community" participation in field
 - Civil representation at each level
 - Not identical to IPT representation
 - Broad representation through Extended DOT Pos/Nav structure
 - IGEB
 - Fulfills role defined in PDD
 - Provides advisory role to DAB
 - Structure currently exists
- AFSPC lead --- parallel level to execution IPTs to participate in and provided guidance for development activities



Civil Involvement in Requirements Process (IRC and IRB)

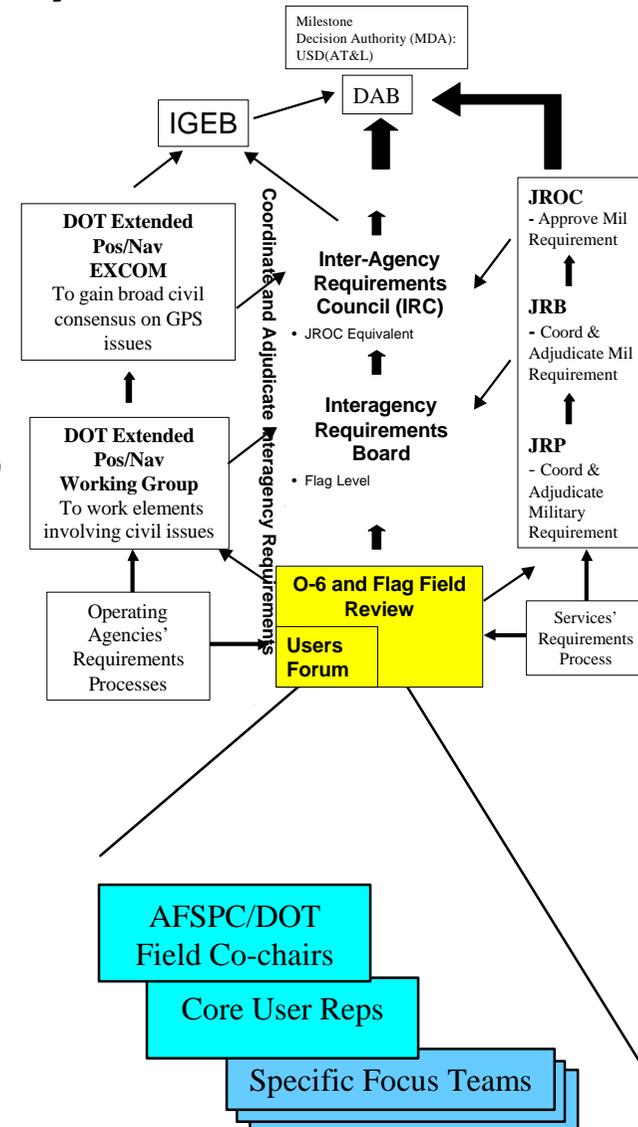
- Interagency Requirements Council
 - Validates interagency requirements only
 - Resolves or forwards issues
- Interagency Requirements Board
 - Reviews interagency requirements
 - Resolves or forwards issues
- Military & Civil chains each review & validate their unique requirements & formulate positions as required to address any issues in interagency process





Civil Involvement in Requirements Process (User's Forum)

- All (JPO, field, HQ) use Users' Forum as exclusive process to communicate issues, concerns, needs
 - JPO to communicate all requirements trades which affect user performance prior to “decision”
 - “What does it mean to the customer” approach
 - Avoid multiple unconsolidated/conflicting inputs to JPO and/or HQ which could cause confusion, poor decisions, chaos, if unchecked
- Civil community implement “field” structure/process to conduct civil-only activities & to participate in users' forum
 - Disciplined, results-oriented, fiscally aware approach
- Military & civil core user reps to actively participate, represent agency, strive for consensus at lowest possible level
 - Properly represent issues, disagreements, needs, & outcomes
 - Provide timely information/responses



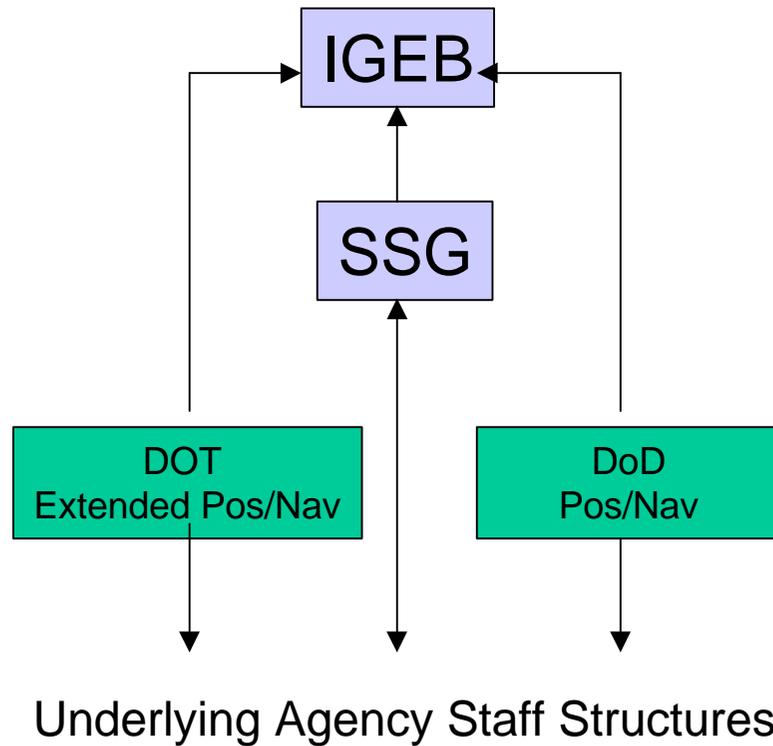


IGEB Advisory Group

- Purpose
 - Increased civil/commercial input
 - International input?
 - Structured IAW FACA rules
- Membership?
- Grow from the IRT
 - Establish based on present IRT Experience
 - Need New Task Order
 - Need Membership Suggestions



Civil Involvement in Plans and Policy Process



- Structure to support Plans and Policy already in place
- Draws from existing Pos/Nav policy structures within DoD and DOT
- Consolidates at the IGEB



Way Ahead

- DoD/DOT MOA -- “*Civil Use of the Global Positioning System*” revision in process
 - Revision of MOA will document roles and responsibilities to put conceptual structure in place
 - Completion of revision currently planned for 2nd Quarter of FY01